What is claimed is:

1. A control unit (1) for controlling safety-critical applications (5), having a microcomputer (MC), a monitoring unit (check unit, CU), and peripheral circuits (input output, IO), wherein the monitoring unit (CU) has first means for measuring the quiescent current of the microcomputer (MC); at least one quiescent current handshake line (IDDQ-HDSHK) for controlling the measurement of the quiescent current runs between the first means of the CU and the MC; the CU has second means for applying a test data input signal for processing the test data output signal and for comparing the corresponding test data output signal of the MC to the corresponding test data output signal of the CU; and at least one test data signal transmission line runs between the second means of the CU and the MC.

2. The control unit (1) as recited in Claim 1, wherein the first means includes an IDDQ measuring circuit (8), a voltage supply (9), an IDDQ measuring run control (MAS) (7), and a control system (6) of the CU; and the connection between the first means and the MC includes two handshake lines (START, END), which run from the IDDQ-MAS to the MC, and at least one voltage supply line (VDD), which runs from the voltage supply (9) to the MC, at least one of the voltage supply lines (VDD) running through IDDQ measuring circuit (8).

3. The control unit (1) as recited in Claim 2, wherein two voltage supply lines (VDD_analog, VDD_digital) run between the voltage source (9) and the MC, one voltage supply line (VDD_digital) running through the IDDQ measuring circuit (8).

4. The control unit (1) as recited in Claim 1, wherein the

23

first means includes an IDDQ measuring circuit (8), a voltage
supply (9), an IDDQ measuring run control (MAS) (7), and a
control system (6) of the CU; and the connection between the
first means and the MC includes four handshake lines (START,
END, CLK, PWR_DN), which run from the IDDQ-MAS (7) to the MC,
and at least one voltage supply line (VDD), which runs from
the voltage supply (9) to the MC, at least one of the voltage
supply lines (VDD) running through IDDQ measuring circuit (8).

5. The control unit (1) as recited in one of Claims 2 through
4, wherein the first means have an initialization circuit
(15), which, after the control unit (1) is switched on,
receives an initialization signal (RST) from the voltage
source (9) and subsequently transmits an enable signal
(IDDQ_EN) to the IDDQ-MAS (7) to enable the IDDQ measurement.

6. The control unit (1) as recited in one of Claims 1 through
5, wherein the second means include a test data signal
generator (10) for applying a test data input signal to the
MC, a response generator (11) for processing the test data
input signal and for forming a corresponding test data output
signal, a test data register (17) for transmitting and
receiving the test data, and a comparator (12) for comparing
the test data output signal of the MC to the test data output
signal of the CU; and the connection between the second means
and the MC includes at least one test data transmission line,
which runs between the test data register (17) and the MC.

7. The control unit (1) as recited in Claim 6, wherein the
connection between the second means and the MC includes two
test data transmission lines (CU_Dout, CU_Din).

8. The control unit (1) as recited in Claim 6 or 7, wherein

24

the second means have a trigger generator (13), which
determines the instant at which the test data output signal of
the MC is available at the comparator (12), given an
error-free MC.

9. The control unit (1) as recited in one of Claims 6 through
8, wherein the second means have an error counter (14), which
counts an error, in the event that the test data output signal
of the MC is not consistent with the test data output signal
of the CU, and/or in the event that the test data output
signal of the MC is available at the comparator (12) at a
different instant that the one determined by the trigger
generator (13).

10. The control unit (1) as recited in Claim 9, wherein the
error counter (14) has a plurality of response thresholds,
exceeding the response threshold resulting in a different
reaction in each case.

11. The control unit (1) as recited in one of Claims 6 through
10, wherein the first means have an initialization circuit
(15), which receives an initialization signal (RST) from the
voltage source (9) after the control unit (1) is switched on,
subsequently synchronizes the CU with the MC, and then
activates the test data signal generator (10) and the error
counter (14).

12. A method for testing a microcomputer (MC) of a control
unit (1) for controlling safety-critical applications, the
control unit having the microcomputer (MC), a monitoring unit
(check unit, CU), and peripheral circuits (input output, IO),
wherein the quiescent current of the MC is measured, a test
data input signal is applied to the MC, a first test data

25

output signal is determined, and a second test data output
signal of the MC is compared to the first test data output
signal of the CU.

13. The method as recited in Claim 12, wherein the quiescent
current measurement is in the form of an IDDQ measurement.

14. The method as recited in Claim 13, wherein the IDDQ
measurement is carried out after the control unit (1) is
switched on after being enabled by an enable signal (IDDQ_EN).

15. The method as recited in Claim 13 or 14, wherein the
second test data output signal of the MC is compared to the
first test data output signal of the CU while the control unit
(1) is in operation.

16. The method as recited in one of Claims 13 through 15,
wherein clock generator (clock, CLK) is stopped by the MC
during the IDDQ measurement and/or while the second test data
output signal of the MC is being compared to the first test
data output signal of the CU.

17. The method as recited in one of Claims 13 through 16,
wherein the test data input signal of the CU is generated by a
test data signal generator (10), via a feedback shift
register.

18. The method as recited in Claim 17, wherein the test data
output signal of the CU is generated by a response generator
(11), with the aid of the Reed-Muller code.